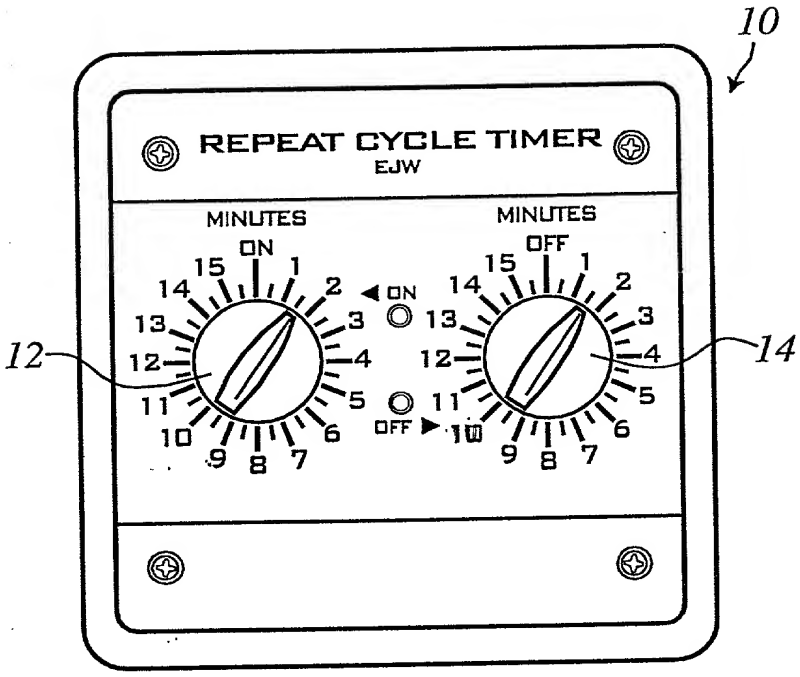

FIG. 1
PRIOR ART

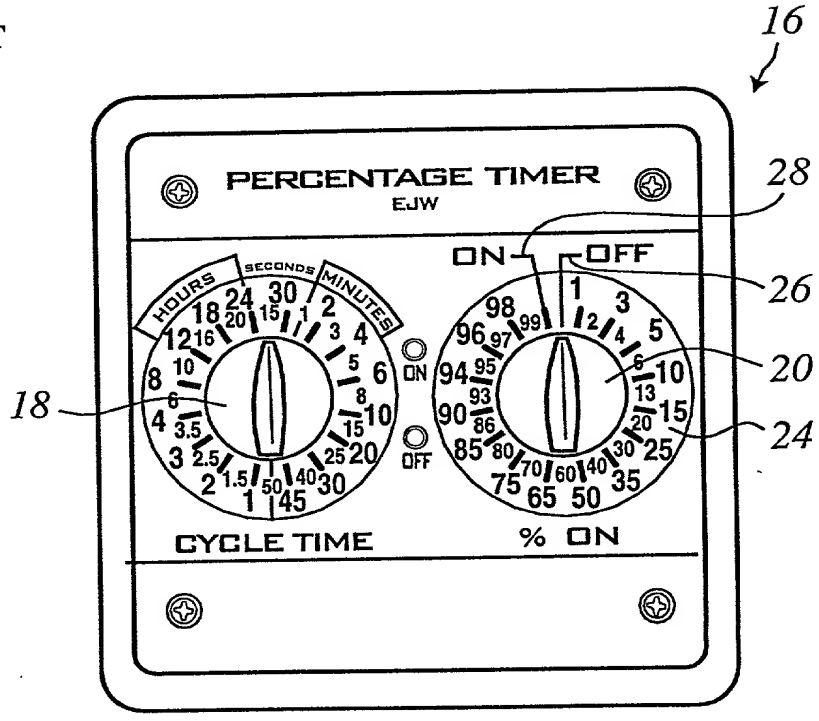

FIG. 2

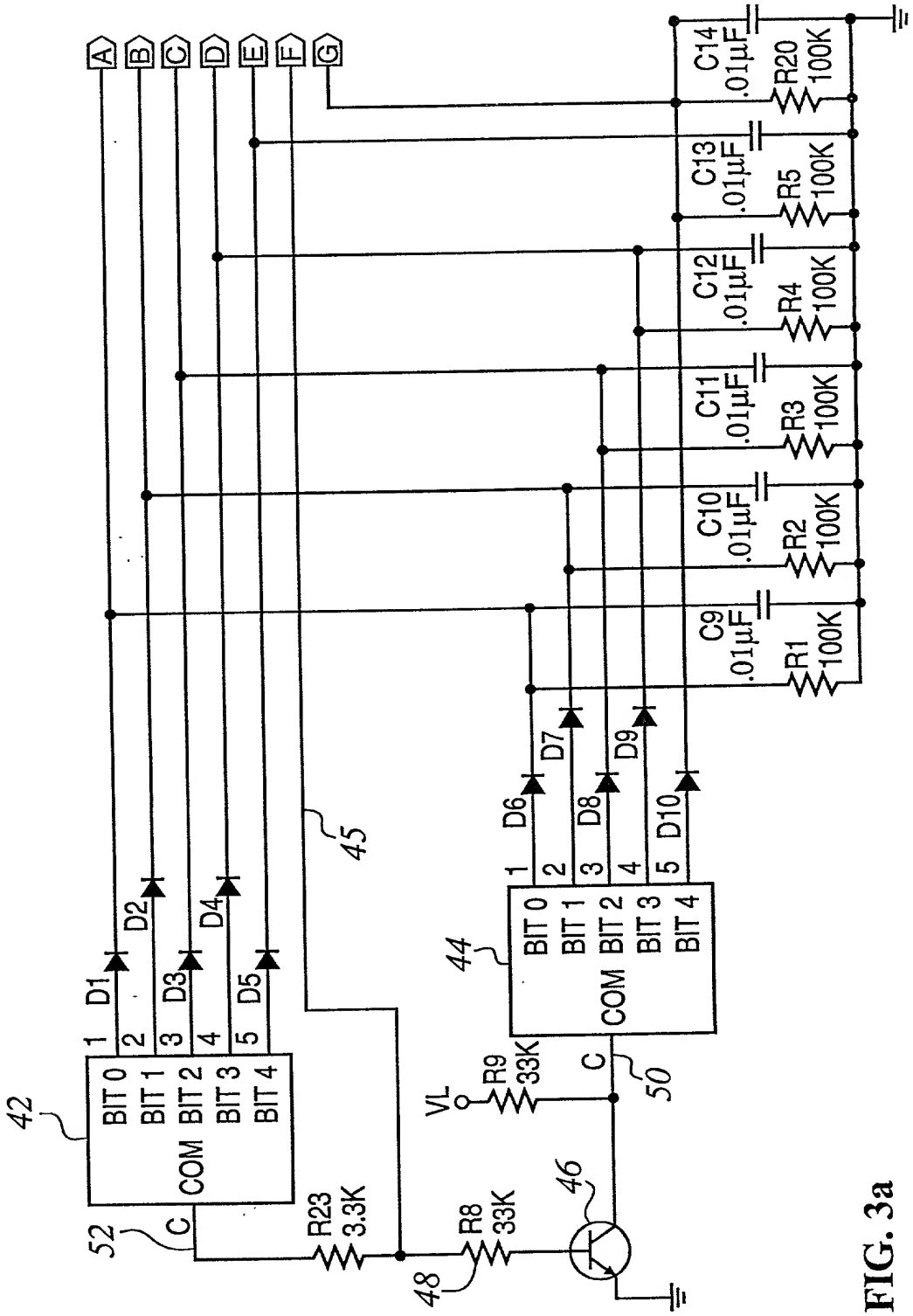
A
B
C
D
E
F
G
42
BIT 0
BIT 1
BIT 2
BIT 3
BIT 4
COM
1
2
3
4
5
D1
D2
D3
D4
D5
52
C
R23
3.3K
48
R8
33K
46
VL
R9
33K
C
50
44
BIT 0
BIT 1
BIT 2
BIT 3
BIT 4
COM
1
2
3
4
5
D6
D7
D8
D9
D10
45
C9
.01µF
R1
100K
C10
.01µF
R2
100K
C11
.01µF
R3
100K
C12
.01µF
R4
100K
C13
.01µF
R5
100K
C14
.01µF
R20
100K

FIG. 3a

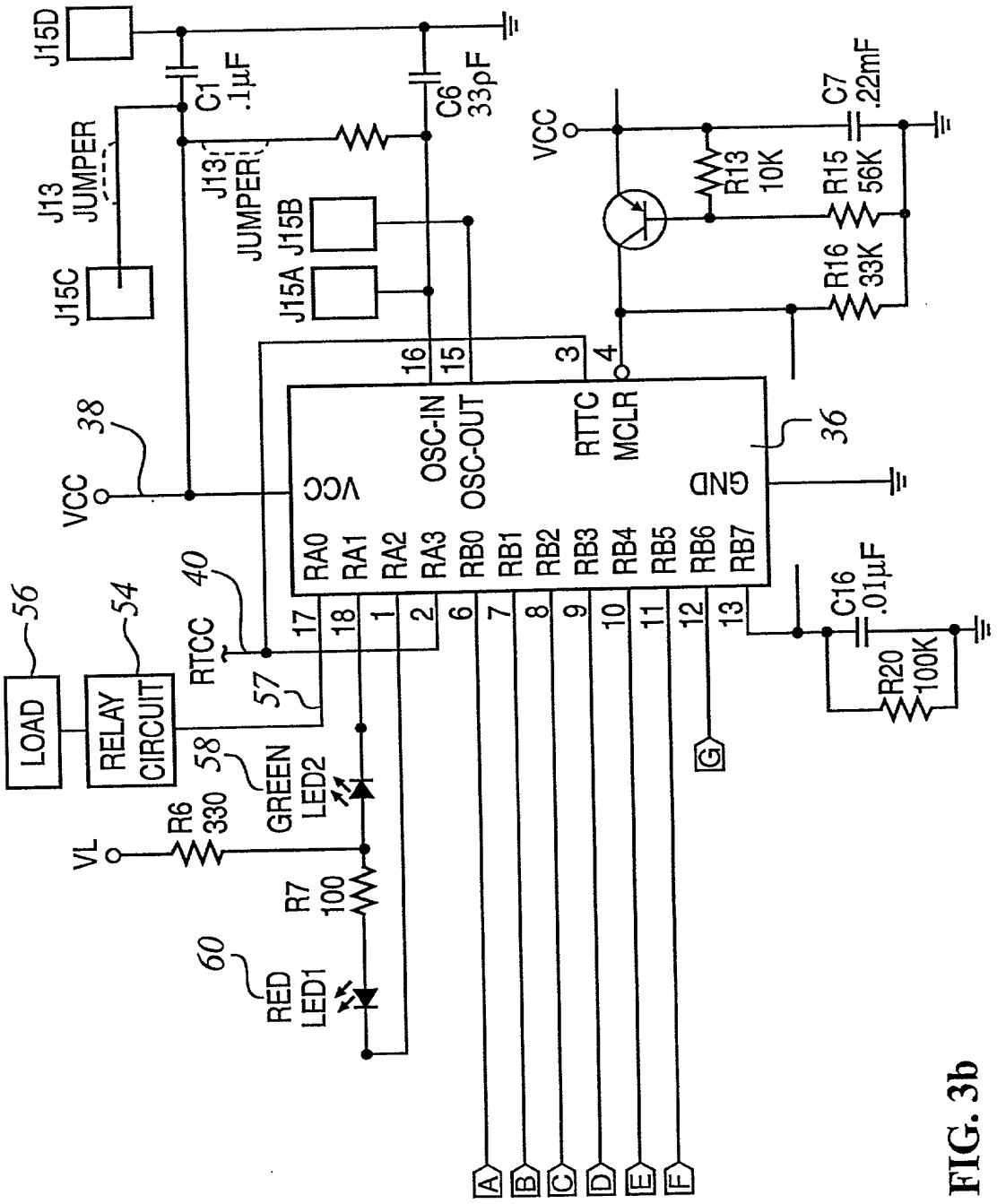
J15D
C1 .1µF
C6 33pF
J13 JUMPER
J13 JUMPER
J15C
J15B
J15A
VCC
38
VCC
R13 10K
R15 56K
R16 33K
C7 .22mF
16
15
3
4
OSC-IN
OSC-OUT
RTTC
MCLR
VCC
GND
36
RA0
RA1
RA2
RA3
RB0
RB1
RB2
RB3
RB4
RB5
RB6
RB7
17
18
1
2
6
7
8
9
10
11
12
13
C16 .01µF
R20 100K
56
54
40
RTCC
57
LOAD
RELAY CIRCUIT
58
GREEN LED2
VL
R6 330
R7 100
60
RED LED1
A
B
C
D
E
F
G

FIG. 3b

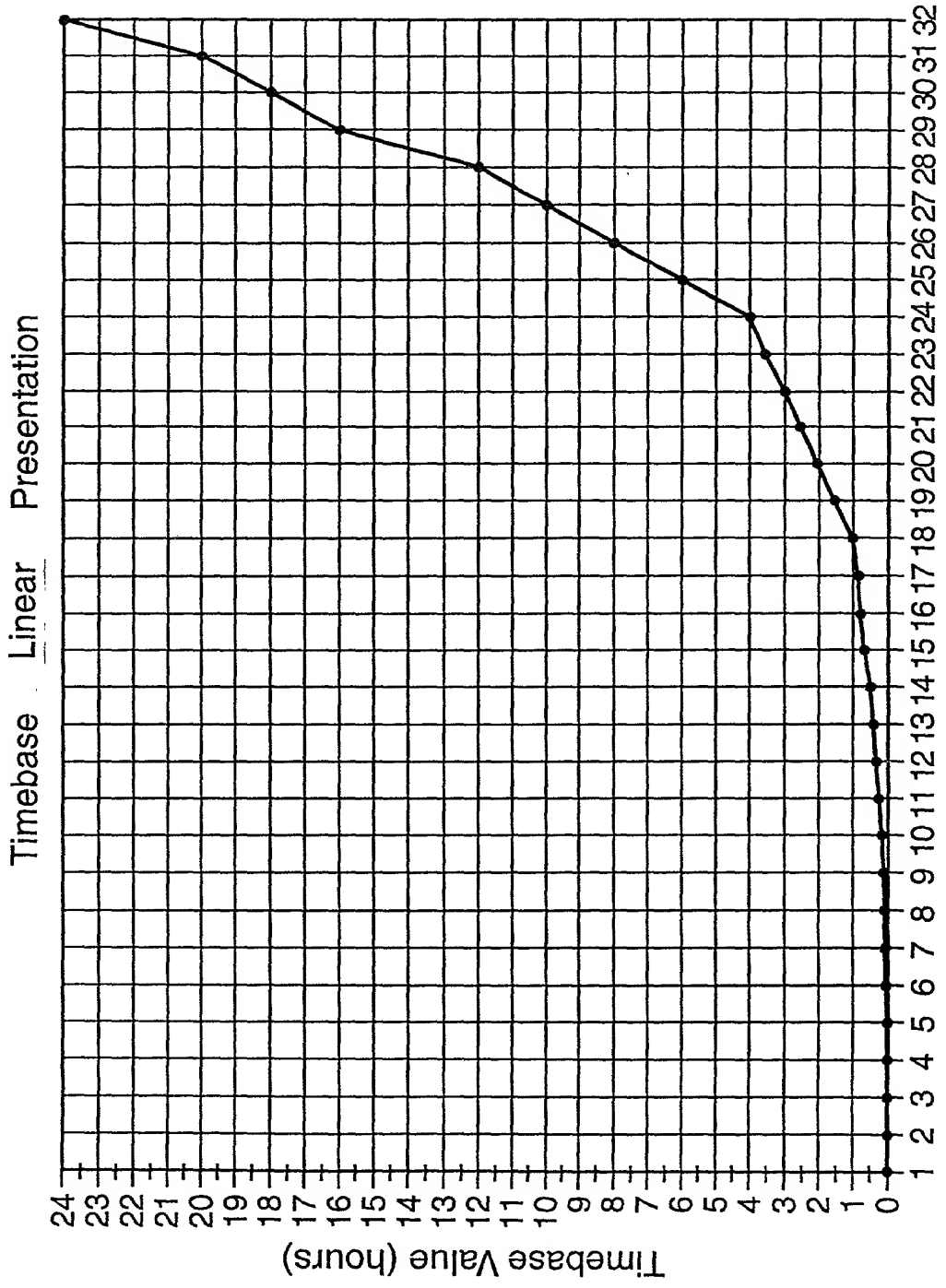
Timebase Linear Presentation
Timebase Value (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Encoder Position

FIG. 4

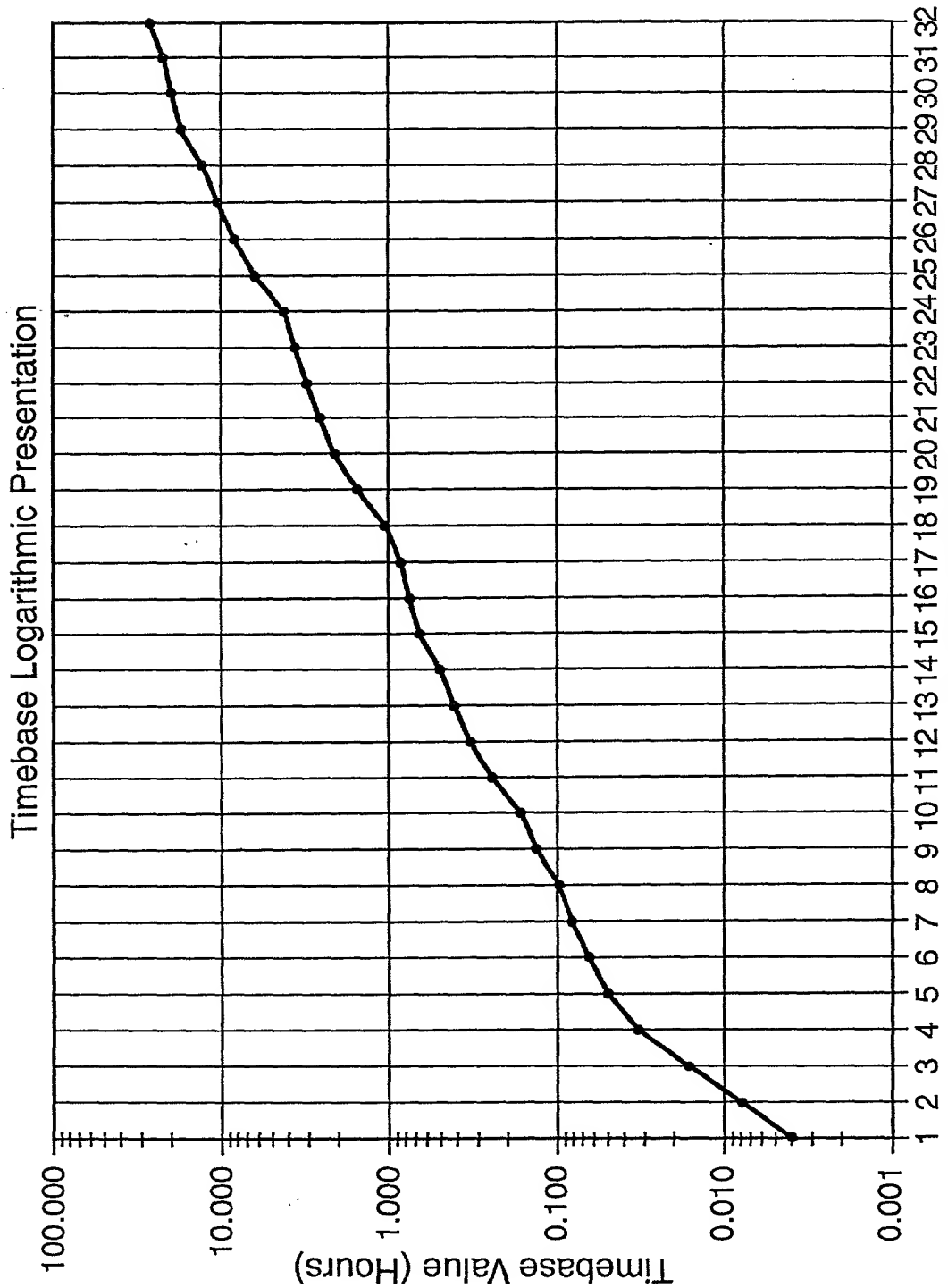
Timebase Logarithmic Presentation
Timebase Value (Hours)
100.000
10.000
1.000
0.100
0.010
0.001
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Encoder Position

FIG. 5

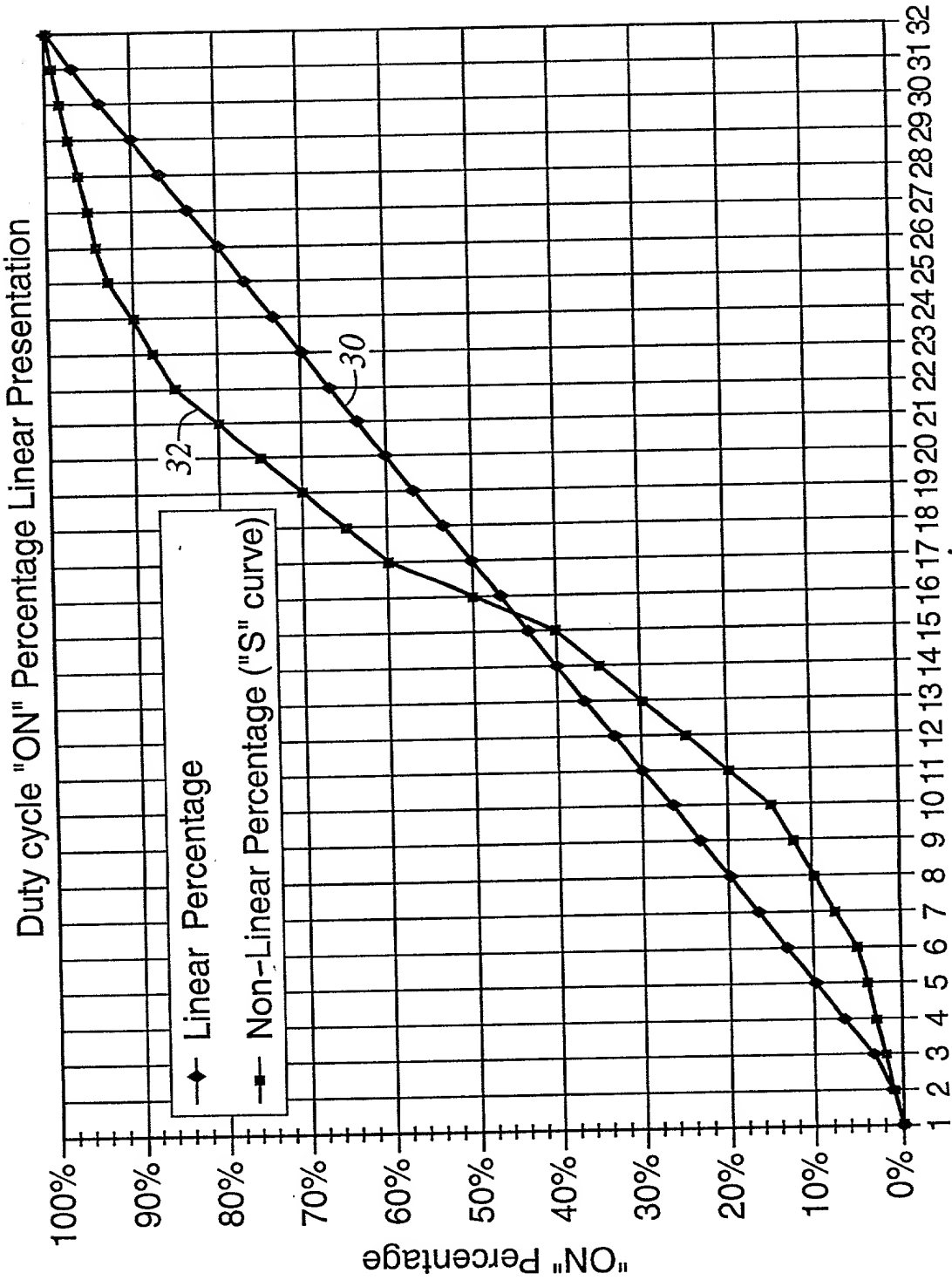
Duty cycle "ON" Percentage Linear Presentation
Linear Percentage
Non-Linear Percentage ("S" curve)
32
30
"ON" Percentage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Encoder Position

FIG. 6

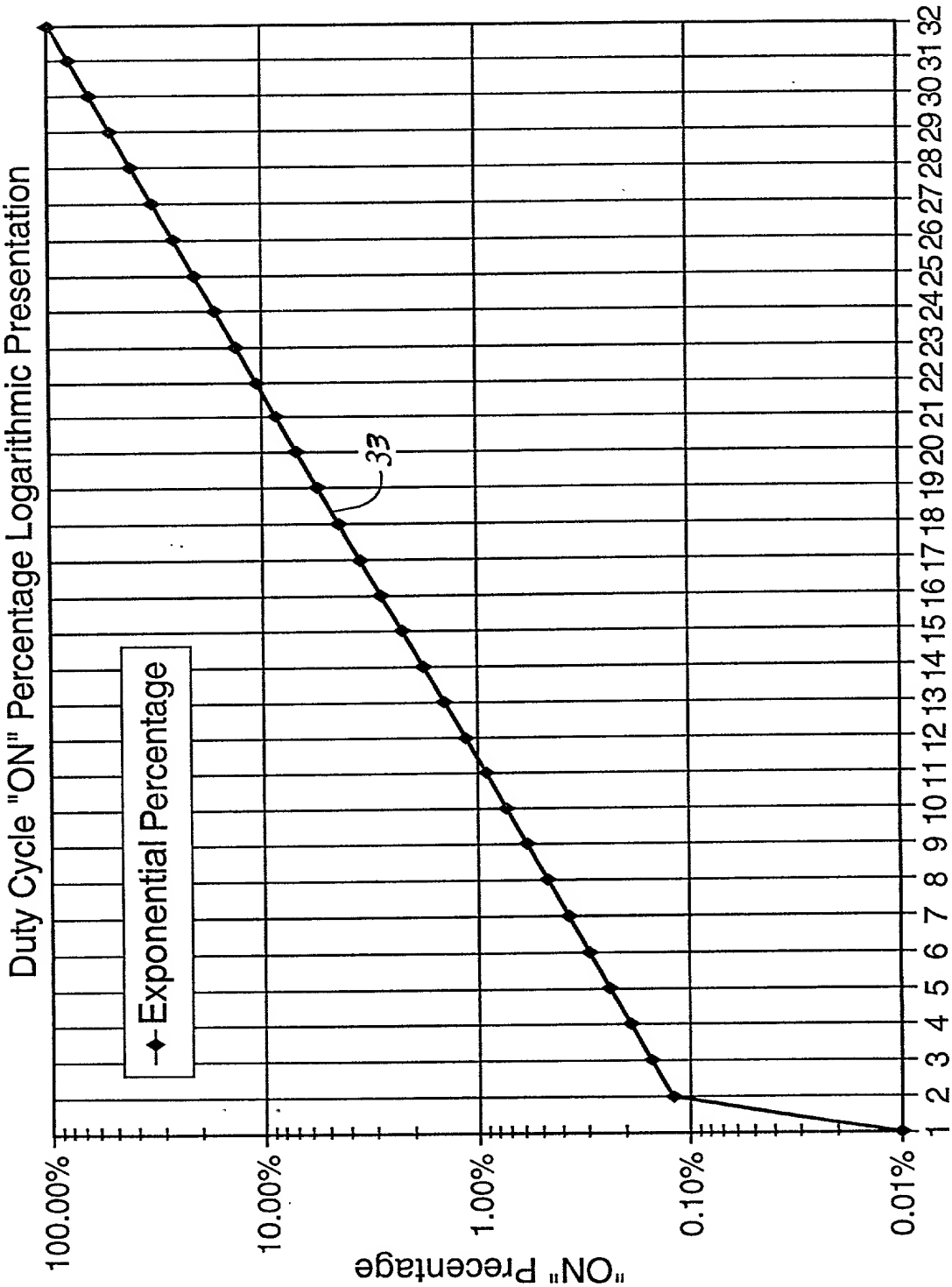
Duty Cycle "ON" Percentage Logarithmic Presentation
Exponential Percentage
33
100.00%
10.00%
1.00%
0.10%
0.01%
"ON" Percentage
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Encoder Position

FIG. 7

TIMEBASE DIAL				
Position	Hours	Minutes	Seconds	Hours
1			15	0.00417
2			30	0.00833
3		1		0.01667
4		2		0.03333
5		3		0.05000
6		4		0.06667
7		5		0.08333
8		6		0.10000
9		8		0.13333
10		10		0.16667
11		15		0.25000
12		20		0.33333
13		25		0.41667
14		30		0.50000
15		40		0.66667
16		45		0.75000
17		50		0.83333
18		60		1.00000
19	1	30		1.50000
20	2	0		2.00000
21	2	30		2.50000
22	3	0		3.00000
23	3	30		3.50000
24	4	0		4.00000
25	6	0		6.00000
26	8	0		8.00000
27	10	0		10.00000
28	12	0		12.00000
29	16	0		16.00000
30	18	0		18.00000
31	20	0		20.00000
32	24	0		24.00000

FIG. 8a

DUTY CYCLE DIAL			
Position	Linear Percentage	Non-linear Percentage ("S" curve)	Exponential Percentage
1	0%	0%	0.01%
2	1%	1%	0.12%
3	3%	2%	0.16%
4	7%	3%	0.20%
5	10%	4%	0.24%
6	13%	5%	0.30%
7	17%	8%	0.38%
8	20%	10%	0.48%
9	23%	13%	0.59%
10	27%	15%	0.74%
11	30%	20%	0.93%
12	33%	25%	1.16%
13	37%	30%	1.45%
14	40%	35%	1.81%
15	43%	40%	2.26%
16	47%	50%	2.83%
17	50%	60%	3.53%
18	53%	65%	4.42%
19	57%	70%	5.52%
20	60%	75%	6.90%
21	63%	80%	8.62%
22	67%	85%	10.77%
23	70%	88%	13.46%
24	73%	90%	16.82%
25	77%	93%	21.02%
26	80%	94%	26.26%
27	83%	95%	32.82%
28	87%	96%	41.01%
29	90%	97%	51.25%
30	93%	98%	64.04%
31	97%	99%	80.03%
32	100%	100%	100.00%

FIG. 8b